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1 1. A method for identifying a drug candidate for promoting tissue-specific
2 differentiation of a stem cell, the method comprising the steps of:
3 (A) providing a library of test substances, the library comprising at least a first test
4 substance and a second test substance, the first and second test substances having different
5 molecular structures;
6 (B) providing an in vitro culture of stem cells, the culture being divided into at
7 least a first subculture and a second subculture;
8 (C) contacting the first subculture with the first test substance and the second
9 subculture with the second test substance;
10 (D) culturing the first and second subcultures respectively contacted with the first
11 and second test substances under conditions that would promote tissue-specific differentiation
12 of the stem cells if an agent that promoted tissue-specific differentiation was in contact with
13 the stem cells; and
14 (E) analyzing the cells in the first and second subcultures for increased tissue-
15 specific gene expression.

1 2. The method of claim 1, wherein the stem cells are embryonic stem cells.

1 3. The method of claim 2, wherein the embryonic stem cells are mammalian
2 embryonic stems cells.

1 4. The method of claim 3, wherein the mammalian embryonic stem cells are
2 murine embryonic stems cells.

1 5. The method of claim 4, wherein the murine embryonic stem cells R1
2 embryonic stems cells.

1 6. The method of claim 3, wherein the mammalian embryonic stem cells are
2 human embryonic stems cells.

1 7. The method of claim 1, wherein the conditions that would promote tissue-
2 specific differentiation of the stem cells comprises culturing the first and second subcultures
3 in a differentiating medium.

1 8. The method of claim 1, wherein the conditions that would promote tissue-
2 specific differentiation of the stem cells comprises culturing the first and second subcultures
3 at about 37°C.

1 9. The method of claim 1, wherein the conditions that would promote tissue-
2 specific differentiation of the stem cells comprises culturing the first and second subcultures
3 in a humidified, carbon-dioxide containing incubator.

1 10. The method of claim 1, wherein the conditions that would promote tissue-
2 specific differentiation of the stem cells comprises culturing the first and second subcultures
3 for a time period of at least five days.

1 11. The method of claim 10, wherein the time period is at least seven days.

1 12. The method of claim 11, wherein the time period is between seven and
2 eighteen days.

1 13. The method of claim 1, wherein the first and second subcultures are cultured
2 in a microtiter plate.

1 14. The method of claim 1, wherein the step (E) of analyzing the cells in the first
2 and second subcultures for increased tissue-specific gene expression comprises isolating
3 mRNA from the first and second subcultures.

1 15. The method of claim 14, wherein total cellular RNA is isolated from the first
2 and second subcultures.

1 16. The method of claim 14, wherein the step (E) further comprises reverse-
2 transcribing the mRNA to create cDNA.

1 17. The method of claim 1, wherein the step (E) of analyzing the cells in the first
2 and second subcultures for increased tissue-specific gene expression comprises performing a
3 polymerase chain reaction (PCR).

1 18. The method of claim 14, wherein the isolated mRNA is immobilized on a
2 substrate.

1 19. The method of claim 18, wherein the substrate is contacted with a probe that
2 specifically hybridizes to the tissue-specific mRNA.

1 20. The method of claim 1, wherein the step (E) of analyzing the cells in the first
2 and second subcultures for increased tissue-specific gene expression is performing using gene
3 chip technology.